

**VERTICAL CAVITY SURFACE EMITTING LASER INCLUDING INDIUM  
AND NITROGEN IN THE ACTIVE REGION**

5                                    **ABSTRACT OF THE DISCLOSURE**

Quantum wells and associated barriers layers can be grown to include nitrogen (N), aluminum (Al), antimony (Sb), phosphorous (P) and/or indium (In) placed within or about a typical GaAs substrate to achieve long wavelength VCSEL performance, e.g., within the 1260 to 1650 nm range. In accordance  
10 with features of the present invention, a vertical cavity surface emitting laser (VCSEL) can include at least one quantum well comprised of InGaAsN; barrier layers sandwiching said at least one quantum well; and confinement layers sandwiching said barrier layers. Confinement and barrier layers can comprise AlGaAs, GaAsN. Barrier layers can also comprise InGaAsN. Quantum wells  
15 can also include Sb. Quantum wells can be developed up to and including 50 Å in thickness. Quantum wells can also be developed with a depth of at least 40 meV.